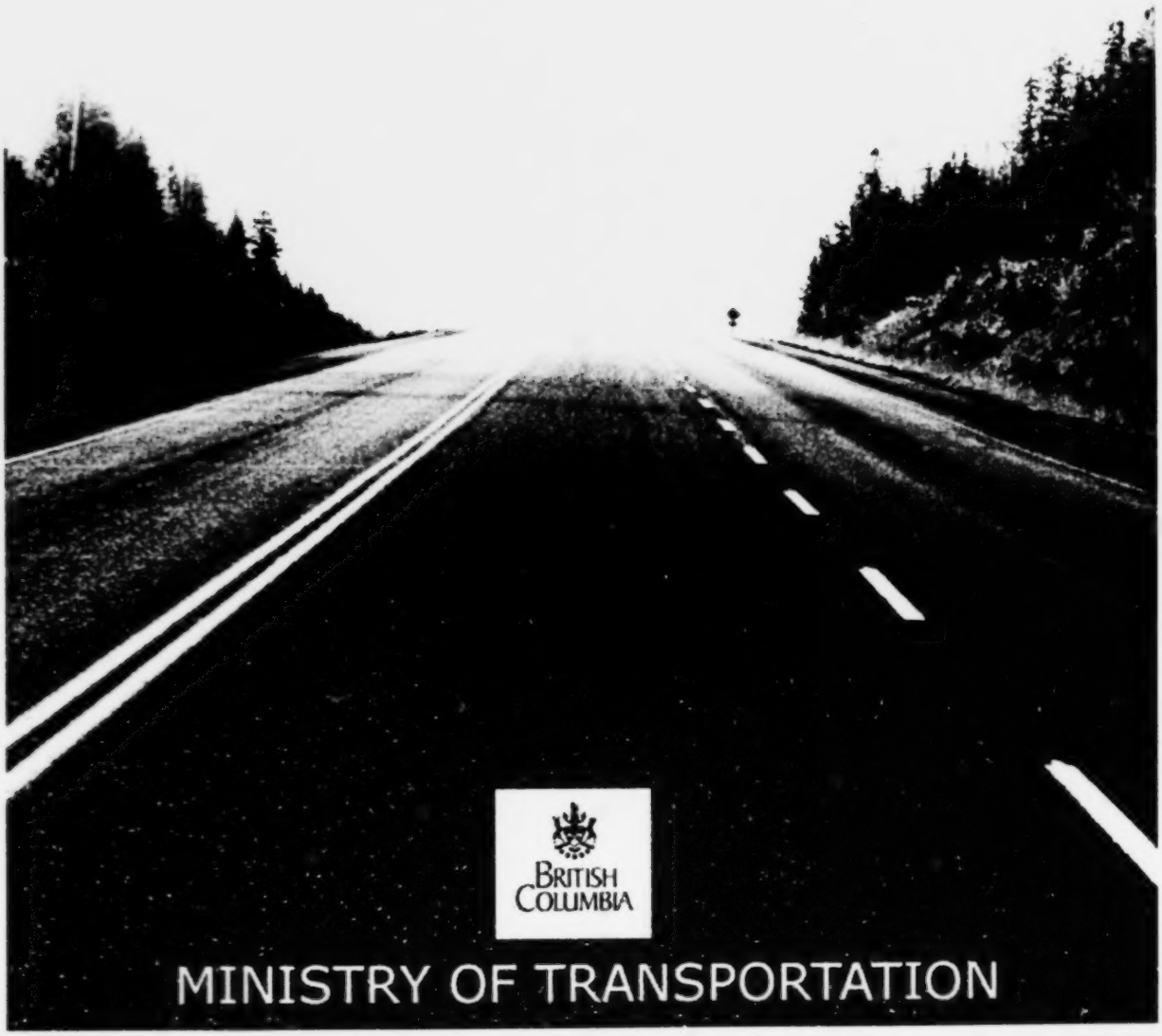
Pest Management Plan
Fort George District
Northern Highway Region

PMP # 102-664-05/09



EXECUTIVE SUMMARY

The British Columbia *Weed Control Act* specifies that land occupiers must control noxious weeds on private or public land. Noxious weeds impact agriculture where they displace or reduce the quality of crop and forage species as well as natural vegetation communities where they out compete native plant species reducing biodiversity and forage for wildlife. It is the B.C. Ministry of Transportations' (MoT) objective and obligation to prevent the spread of noxious and Invasive weeds along highway corridors. The *Integrated Pest Management Act & Regulations* provide the legislative authority to allow pesticide use on public lands to be covered under a Pest Management Plan (PMP). Other invasive alien plant species not designated as noxious under the Weed Control Act have spread to areas of Northern B.C. outside of the their native range causing negative impacts. This PMP will cover noxious weed treatments within the MoT Fort George District of the Northern Highways Region as well as other non-legislated invasive alien plant species infestations which have been determined to have caused significant operational and/or environmental impacts. Problem vegetation targeted under this document are referred to as "invasive weeds".

Integrated Pest Management (IPM) principles are used under this PMP. This involves the selection of treatments that most effectively target specific invasive weed species while minimizing impacts to the environment. Since the specific objective of this PMP is to target invasive weeds, this document uses the term Integrated Vegetation Management (IVM). IVM techniques detailed within this PMP include prevention, physical controls (manual, mowing), natural controls (plant competition), biological controls (insect agents) along with herbicide applications. Extreme caution will be exercised when working around waterbodies, water intakes, domestic wells and other environmentally sensitive areas (agricultural lands, sensitive wildlife habitat, high value berry patches). Pesticide Free Zones (PFZs) will be maintained adjacent to these sensitive areas when applying herbicides.

Both federal and provincial legislation contain sections pertinent to MoT vegetation management operations. MoT vegetation work may also be reviewed by several higher level planning authorities including any Regional Pesticide Review Committee, local Land Use Plan managers, the North West Invasive Plant Committee (NWICP) and the Pest Management Regulatory Agency. To be effective, the MoT invasive weed program must operate in cooperation with many other individuals, agencies and land managers since weed infestations occur across many different land uses. Weed management is most effective when the multi-jurisdictional coordination includes all adjacent land owners to ensure that effective prevention of spread and overall control is achieved. Management of invasive weeds by MoT within Northern British Columbia are implemented based on the principles outlined by the NWIPC.

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1.0 INTRODUCTION

1.1 OVERVIEW

The British Columbia Ministry of Transportations' (MoT) Fort George District of the Northern Highways Region encompass an area from 17 kilometers south of Avola to the junction of Hwy 97 & 39 in the north and from 33 km east of Burns Lake in the west to the Alberta boarder in the east. This area covers about 6,455 lane kilometers of highways and secondary roads. British Columbia's highways are numerous and complex. Important natural resource values on highways rights-of-way and along adjacent properties such as rangelands and forests sustain food and fiber production, protect watersheds, provide wildlife habitat and recreation sites, maintain a healthy diversity of flora and fauna, and appeal to aesthetic values.

This PMP covers treatments within the MoT Fort George District of the Northern Highways Region of noxious weeds as well as other non-legislated invasive alien plant species infestations which have been determined to have caused significant operational and/or environmental impacts. Problem vegetation targeted under this document are referred to as "invasive weeds".

1.2 TERM OF PMP

Recent development to the new *Integrated Pest Management Act & Regulations* includes legislation to allow pesticide uses that previously fell under Regional Pesticide Use Permits to be included under a single, comprehensive Pest Management Plan (PMP). This 5 year PMP replaces any previous MoT Pesticide Use Permits covering herbicide applications in the Fort George Highways District of the Northern MoT Region. The proposed term of this PMP is March 28, 2005 to March 27, 2010.

The MoT PMP is required to ensure;

- Compliance with the *Integrated Pest Management Act & Regulations*,

- Public awareness and consultation of, and input into, MoT's vegetation management program,
- Responsible use of herbicides,
- That effective implementation of integrated programs (using a combination of herbicides and non-chemical techniques) take into account land uses & environmentally sensitive areas and minimizes the sole reliance of herbicides.

This PMP utilizes Integrated Pest Management principles that involve the selection of treatments, which most effectively target specific plant species while minimizing impacts to the environment. Since the specific objective of this PMP is to target noxious and other invasive alien weed species of concern, this document will use the term Integrated Vegetation Management (IVM).

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2.0 INVASIVE ALIEN PLANT SPECIES

The spread of invasive plants is one of the most serious problems affecting native plant and animal communities within British Columbia. Most invasive plants are introduced alien weeds from other countries which have the capacity to establish quickly and easily on new sites. Invasive alien plants normally have no natural predators or pathogens to reduce their vigour and spread and are commonly very aggressive plants that are capable of colonizing areas and replacing desirable indigenous plant communities. After habitat destruction, they are the second greatest threat to the diversity of natural resources within B.C. They adversely affect ecological processes in some of the province's most valuable and productive wildlife and recreational habitats. Invasive alien plants cause large economic impacts within British Columbia costing ranchers, farmers, conservations groups, utility companies, foresters, governments, and the general public millions of dollars each years.

Specific impacts of invasive alien plants include:

- killing natural grasses and wildflowers, including rare and endangered species,
- destroying natural habitat for wildlife, birds and domestic animals,
- destroying habitat for fish and other aquatic organisms,
- reducing the yield and quality of agricultural crops,
- interfering with the regeneration of forests,
- increasing wildfire hazards,
- increasing soil erosion and stream sedimentation,
- ruining water quality,
- endangering public health and safety,
- increasing allergies and hay fever,
- toxicities to humans, pets, livestock and wildlife,
- carriers of disease and harmful insects to beneficial plants,
- clogging waterways using for swimming and boating,
- destroying recreational opportunities and the beauty of the landscape,
- reducing visibility on transportation corridors,
- increasing costs for maintaining resources and public utilities,
- decreasing the value of marketable livestock,
- decreasing land values.

2.1 NOXIOUS WEEDS

Certain invasive alien plant species are legislated within British Columbia as "noxious" within the provincial *Weed Control Act*. The *Act* defines a noxious weed as "*a weed designated by regulation to be a noxious weed, and includes the seeds of the noxious weed*". The Act states: "*Every occupier shall control, in accordance with the regulations, noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by him.*" (1) This means that landowners, private companies, utility companies, regional districts and municipalities, and provincial government agencies or anyone else in physical possession of land all have a responsibility to manage weeds in the province.

The *Weed Control Act* currently designates 48 plant species as noxious weeds within British Columbia. Currently, 21 weeds are listed as noxious weeds within all regions of the province. Although the remaining 27 species are classified as noxious within the boundaries of specified regional districts within the province, 15 of these weeds are designated within regional districts located in Northern British Columbia.

Spotted Knapweed

Listed below are the weeds designated noxious under the *Weed Control Act* for all regions of the province and within specific regional districts in Northern B.C.

Weeds classified as noxious within all regions of the province

Common Name	Scientific Name
Annual Sowthistle	*Sonchus oleraceus*
Canada Thistle	*Cirsium arvense*
Crupina	*Crupina vulgaris*
Dalmatian Toadflax	*Linaria dalmatica*
Diffuse Knapweed	*Centaurea diffusa*
Dodder	*Cuscuta* spp.
Gorse	*Ulex europaeus*
Hound's-tongue	*Cynoglossum officinale*
Jointed Goatgrass	*Aegilops cylindrica*
Leafy Spurge	*Euphorbia esula*
Perennial Sowthistle	*Sonchus arvensis*
Purple Nutsedge	*Cyperus rotundus*
Rush Skeletonweed	*Chondrilla juncea*
Scentless Chamomile	*Matricaria maritima*
Spotted Knapweed	*Centaurea maculosa*
Tansy Ragwort	*Senecio jacobaea*

Weeds classified as noxious within all regions of the province

Velvetleaf	*Abutilon theophrasti*
Wild Oats	*Avena fatua*
Yellow Nutsedge	*Cyperus esculentus*
Yellow Starthistle	*Centaurea solstitialis*
Yellow Toadflax	*Linaria vulgaris*

Weeds classified as noxious within specific regional districts of Northern British Columbia

Common Name	Scientific Name	Regional District(s)
Burdock	*Arctium* spp.	Bulkley-Nechako, Fraser-Fort George, Kitimat-Stikine, Peace River
Cleavers	*Galium aparine*	Peace River
Common Tansy	*Tanacetum vulgare*	Bulkley-Nechako
Field Scabious	*Knautia arvensis*	Bulkley-Nechako
Green Foxtail	*Setaria viridis*	Peace River
Kochia	*Kochia scoparia*	Peace River
Marsh Plume Thistle	*Cirsium palustre*	Bulkley-Nechako, Fraser-Fort George
Night-Flowering Catchfly	*Silene noctiflora*	Peace River

Orange Hawkweed	*Hieracium aurantiacum*	Bulkley-Nechako
Oxeye Daisy	*Chrysanthemum leucanthemum*	Peace River
Quackgrass	*Agropyron repens*	Peace River
Russian Thistle	*Salsola kali*	Peace River
Tartary Buckwheat	*Fagopyrum tataricum*	Peace River
White Cockle	*Lychnis alba*	Peace River
Wild Mustard	*Sinapsis arvensis*	Peace River

Fact sheets, guidebooks and web-site information to aid in the identification and management of noxious weeds are available through the British Columbia Ministry of Agriculture, Food and Fisheries. Web site links to aid in the identification of noxious weeds are listed below:

www.agf.gov.bc.ca/weeds.htm

www.weedsbc.ca

2.2 NON-LEGISLATED INVASIVE WEEDS

Other invasive alien plant species not legislated as noxious under the *Weed Control Act* have spread to areas of the province outside of their native range causing negative impacts. The control of these nuisance weeds can be controversial since they may not cause an impact or may provide a benefit to some land users while negatively impacting others. Certain highly invasive weeds not currently on the Provincial or Regional District Noxious Weed lists may be classified as 'Weed Alert' species by the provincial Ministry of Agriculture, Food and Fisheries. Specific infestations of non-legislated invasive weeds may be treated by MoT where the weed species has been determined to have caused significant operational and/or environmental impacts. Non-legislated invasive weeds of concern within Northern British Columbia include;

Non-legislated Invasive Weeds of Concern Within Northern British Columbia

Common Name	Scientific Name	Common Name	Scientific Name
Agrimony	*Agrimonia striata*	Lamb's-quarter	*Chenopodium* spp.
Barley, Foxtail	*Hordeum jubatum*	Lettuce, tall blue	*Lactuca* ssp.
Bergamont, Wild	*Monarda fistulosa*	Loosestrife	*Lythrum* spp.
Blue Buttons	*Centaurea cyanus*	Medic, black	*Medicago lupulina*
Blueweed*	*Echium vulgare*	Mullein	*Verbascum thapsus*
Bluet, Mountain	*Centaurea montana*	Mustard, Dog	*Eruscastrum gallicum*

Bluebur, Western	*Lappula echinata*	Mustard, Hedge	*Sisymbrium officinale*
Buckwheat, wild	*Polygonum convolvulus*	Mustard, Tumble	*Sisymbrium* ssp.
Bugloss, small	*Lycopsis arvensis*	Mustard, Wild	*Sinapsis arvensis*
Campion, bladder	*Silene cucubalus*	Pineapple Weed	*Matricaria matricarioides*
Chicory	*Cichorium intybus*	Pennycress	*Thlaspi arvense*
Cockle, White	*Lychnis alba*	Primrose, Evening	*Oenothera biennis*
Dock, curled	*Rumex crispus*	Safflower	*Carthamus tinctorius*
Dragonhead, American	*Dracocephalum parviflorum*	Scotch Broom	*Cystisus scoparius*
Fleabane, Canadian	*Conyza canadensis*	St. John's-wort	*Hypericum perforatum*
Goast's-beard	*Tragopogon dubious*	Stinkweed	*Thlaspi arvense*
Groundsel, Common	*Senecio vulgaris*	Tarweed	*Madia glomerata*
Hawksbeard, Narrowleaf	*Crepis tectorum*	Thistle, Nodding	*Carduus nutans*
Hemp-nettle	*Galeopsis tetrahit*	Thistle, Plumeless	*Carduus acanthoides*
Hop-clover	*Trifolium agrarium*	Vetch, Tufted	*Viccia cracca*
Iris, Yellow Flag	*Iris Pseudacorus*	Water Hemlock, Western	*Cicuta douglasii*
Knapweed, black, brown & greater	*Centaurea nigra, C. jacea, C. greater*	Wormwood	*Artemisia absinthium*
Knotweeds	*Polygonum* ssp.		

* not classified as noxious within the *Weed Control Act* for regional districts within Northern B.C.

The list of non-legislated invasive weeds of concern within Northern British Columbia has been developed in consultation with the North West Invasive Plant Committee and the British Columbia Ministry of Forests.

2.3 CATEGORIZING WEEDS & PRIORITIZING SITES

2.3.1 North West Invasive Plant Committee

Weed management activities within Northern British Columbia adhere to the principles outlined by the North West Invasive Plant Committee (NWIPC) which has a broad-based membership including government agencies, utility companies, environmental groups, livestock associations, First Nations and the general public. Detailed are the goals of the NWIPC as detailed in their 2004-05 Plan & Profile.

- Encourage the public to report invasive plant sightings. (This requires adequate and prompt feedback to persons who report invasive plants).

- Inform the public about invasive plant programs so they can provide relevant comment.
- Develop and maintain a shared invasive plant inventory.
- Assess problems and threats that various invasive plants present to the environment and economy of the area. Categorize invasive plants and prioritize sites for control.
- Prevent the establishment of invasive plants not currently in the region. Prevent or minimize the spread of the invasive plants present in the region.
- Conduct invasive plant programs in the North West using Integrated Pest Management principles as described in the 'Invasive Plant Strategy for BC'.
- Coordinate the activities and responsibilities of the various agencies and private landowners to ensure NWIPC goals are met.
- Management of invasive weeds by MoT within Northern British Columbia are implemented based on the principles outlined by the NWIPC.

2.3.2 Invasive Weed Categories

The NWIPC has categorized invasive weed species which have arrived or are expected to arrive in Northern B.C. based on their level of invasiveness. The list includes both weed species legislated as noxious under the *Weed Control Act* as well as non-legislated invasive weeds of concern.

CATEGORY 1
EXTREMELY INVASIVE

Category 1 invasive plants invade even undisturbed habitats and dominate them. Domination implies the invasive plant becomes the most abundant species across the entire site or area of the plant community being invaded. The invasion can progress slowly or rapidly.

Common Name	Scientific Name	Common Name	Scientific Name
Broom	*Cytisus scoparius*	Knotweeds	*Polygonum* spp
Gorse	*Ulex europaeus*	Scabious, field or bluebuttons	*Knautia arvensis*
Iris, yellow flag	*Iris pseudacorus*	Spurge, leafy	*Euphorbia esula*

Knapweed, black & brown	*Centaurea nigra* & *C jacea*	Tansy, common	*Tanacetum vulgare*
Knapweed, greater	*Centaurea greater*	Thistle, marsh plume	*Cirsium palustre*
Knapweed, spotted	*Centaurea maculosa*	Toadflax, dalmation	*Linaria dalmatica*

CATEGORY 2
VERY INVASIVE

Category 2 invasive plants invade even undisturbed habitats. They become very prevalent and may form dense patches but usually do not dominate the entire site or area of the plant community. If category 2 invasive plants invade the entire site or plant community they tend not to dominate the site.

Common Name	Scientific Name	Common Name	Scientific Name
Blueweed	*Echium vulgare*	Knapweed, diffuse	*Centaurea diffusa*
Burdock, common	*Arctium minus*	Loosestrife	*Lythrum* spp.
Chamomile, scentless	*Matricaria maritima*	Ragwort, tansy	*Senecio jacobeae*
Daisy, oxeye	*Chrysanthemum leucanthemum*	Thistle, Canada	*Cirsium arvense*
Hawkweeds	*Hieracium spp.*	Thistle, plumeless	*Carduus acanthoides*
Hounds tongue	*Cynoglossum officinale*		

CATEGORY 3
INVASIVE

Category 3 invasive plants can invade undisturbed habitats but they usually require some disturbance to gain entry. Once in a habitat they usually do not dominate the site unless management problems are occurring.

Common Name	Scientific Name	Common Name	Scientific Name
Catchfly, night-flowering	*Silene noctiflora*	Thistle, sow	*Sonchus* spp.
Goat's-beard	*Tragopogon dubious*	Toadflax, common	*Linaria vulgaris*
Thistle, bull	*Cirsium vulgare*	Wormwood or absinthium	*Artemisia absinthium*

CATEGORY 4
AGGRESSIVE OR UNDER BIOCONTROL

Category 4 invasive plants can invade even undisturbed habitats but they do so at a slow pace and rarely dominate the site. Category 4 invasive plants may go through large population fluctuations. This may be the result of the fluctuation in biocontrol agent populations or cyclic patterns the plant displays. Native plants that behave in a weedy manner are listed in this category.

Common Name	Scientific Name	Common Name	Scientific Name
Agrimony	*Agrimonia striata*	Lamb's-quarter	*Chenopodium* spp.
Barley, foxtail	*Hordeum jubatum*	Lettuce, tall blue	*Lactuca* spp.
Bergamont, wild	*Monarda fistulosa*	Medic, black	*Medicago lupulina*
Blue buttons	*Centaurea cyanus*	Mullien	*Verbascum thapsus*

Bluet, mountain	*Centaurea montana*	Mustard, dog	*Eruscastrum gallicum*
Bluebur, western	*Lappula echinata*	Mustard hedge	*Sisymbrium officinale*
Buckwheat, wild	*Polygonum convolvulus*	Mustard, tumble	*Sisymbrium spp.*
Bugloss, small	*Lycopsis arvensis*	Mustard, wild	*Sinapis arvensis*
Campion, bladder	*Silene cucubalus*	Pineapple weed	*Matricaria matricarioides*
Chicory	*Cichorium intybus*	Pennycress	*Thlaspi arvense*
Cockle, white	*Lychnis alba*	Primrose, evening	*Oenothera biennis*
Dock, curled	*Rumex crispus*	Safflower	*Carthamus tinctorius*
Dragonhead, American	*Dracocephalum parviflorum*	St. John's-wort	*Hypericum perforatum*
Fleabane, Canadian	*Conyza canadensis*	Stinkweed	*Thlaspi arvense*
Groundsel, common	*Senecio vulgaris*	Tarweed	*Madia glomerata*
Hawksbeard, narrowleaf	*Crepis tectorum*	Thistle, nodding	*Carduus nutans*
Hemp-nettle	*Galeopsis tetrahit*	Vetch, tufted	*Viccia cracca*
Hop-clover	*Trifolium agrarium*	Water hemlock, western	Cicuta douglasii

3.0 LEGISLATION & AUTHORITIES

3.1 LEGISLATION

Federal and provincial legislation, which contain sections pertinent to MoT vegetation management operations include, but are not limited to;

3.1.1 Federal

Canada Seed Act provides guidelines for the content of noxious weed seeds in crop seed, and transportation of crop seed in Canada.

Fisheries Act establishes criteria for the protection of fisheries and fish habitat from pesticides.

Food and Drugs Act describes restrictions on pesticide use on livestock forage and where humans will consume livestock.

Migratory Birds Convention Act describes the requirements to protect migratory birds from pesticides.

Pesticide Control Products Act summarizes the registration and availability of pesticides and prohibits application under unsafe conditions.

Pesticide Residue Compensation Act details possible compensation for farmers whose crops have been seized by the Health Protection Branch.

Plant Protection Act describes the requirements for the introduction of biocontrol agents into Canada.

Transportation of Dangerous Goods Act provides information regarding the storage and transportation of pesticides (and other dangerous goods).

Waste Management Act outlines procedures for the disposal of pesticide wastes.

3.1.2 Provincial

Environmental Appeal Board Procedure Regulation governs the process for appeals of pesticide use permits.

Environmental Management Act (Bill 57-2003) prohibits the introduction of wastes into the environment without a permit or approval of compliance. The legislation regulates activities such as transportation and storage of wastes, disposal of unused petroleum or herbicide products, empty petroleum or herbicide containers and herbicide contaminated rinse water.

Highways Act includes all public streets, roads, ways, lanes, bridges, trestles, ferry landings and approaches, and any other public ways. All roads, other than private roads, are deemed to be common and public highways subject to Section 4(3).

Integrated Pest Management Act & *Regulations* prohibits the application of pesticides, including herbicides, on Crown or public land except under an authorization of a Pesticide Use Permit or a confirmation of a Pest Management Plan from the PMP holder. The legislation regulates the handling, storage, disposal, and sale of pesticides.

The Ministry of Water, Land and Air Protection administrates the *Act* and supporting regulations from regional offices within the province. Pest Management Plans are developed by the proponent following mandatory legislated standards.

Pest Management Plans are defined under this legislation and must include the following information:

Integrated Pest Management (IPM) is defined in the same legislation to mean; a decision making process that uses a combination of techniques to suppress pests,

Waste Management Act prohibits the introduction of wastes into the environment without a permit or approval of compliance. The legislation regulates activities such as transportation and storage of wastes, disposal of unused petroleum or herbicide products, empty petroleum or herbicide containers and herbicide contaminated rinse water.

Weed Control Act outlines the obligation to control designated noxious weeds by the land occupier.

Wildlife Act establishes criteria for the protection of wildlife and wildlife habitat.

Workers Compensation Act enforces the Industrial Health and Safety Regulations when carrying out herbicide applications and other vegetation management activities on MoT highway rights-of-way.

Transportation of Dangerous Goods Act sets out regulations and standards for the movement of dangerous goods within the province.

3.2 Authorities

Vegetation management work undertaken by the MoT under this PMP may be reviewed by several higher level planning authorities.

3.2.1 Regional Pesticide Review Committee

The Regional Pesticide Review Committee (RPRC) is comprised of federal representatives from Environment Canada, Health Canada, (Pest Management Regulatory Agency) as well as provincial representation from the B.C. Ministry of Agriculture, Food and Fisheries, B.C. Ministry of Health, B.C. Ministry of Forests, and B.C. Ministry of Water, Land and Air Protection. Members of the committee may review and comment on draft PMPs to ensure that pesticide treatment proposals will not cause unreasonable adverse effects to the environment or human health.

3.2.2 Northern Land Use Plans

The following Land & Resource Management Plans are within the boundaries of this PMP. They specify many objectives, some of which are included in the bullets below.

Prince George Land & Resource Management Plan

- Prepare and implement plans to rehabilitate areas of soil disturbance, stream channel disturbance, or other types of disturbance that may impact fish habitat.
- Discourage impacts from recreationalists on the environment (e.g., litter, damage to soil, **vegetation**, wildlife, livestock, pastures etc.).
- Establish Visual Quality Objectives for high priority scenic areas.
- Must develop specific strategies, to minimize or mitigate impacts on this resource.
- Ensure the availability of basic natural resources, land, water and **vegetation** resources.
- Maintain rare and uncommon habitats, plants and/or animal species.

Robson Valley Land & Resource Management Plan

- Reduce the need for herbicides and pesticides by using appropriate management strategies.
- There is no formal requirement for the Ministry of Transportation and Highways to post signs along the highway right-of-way when using herbicides, other than those required under any herbicide application permit. However, the ministry is encouraged to undertake a more vigorous and active consultation and public notice program in the Robson Valley.
- Raise public awareness of and participation in noxious weed control through signage and public information.
- Limit the use of pesticides, herbicides, fertilizers and petroleum products adjacent to water bodies and prevent entry of contaminants into the water cycle.

Vanderhoof Land & Resource Management Plan

- Conservation of one -or more non-consumptive resource values such as habitat, recreation, scenery and community watersheds, is a priority.

- Revegetate all new ditches, landings, gravel pits, and winter roads to minimize surface soil erosion, provide forage, and be visually acceptable.
- Identify, restore and/or enhance critical habitat.
- Maintain diversity and abundance of native species and their natural habitats.

Fort St. James Land & Resource Management Plan

- Address effects of recreational activities on ecological integrity (i.e., wildlife disruption, damage to plant communities, water quality).
- Identify and assess visual values and integrate these into resource management practices.
- Continue to monitor forest health by the Ministry of Forests in co-operation with BC Parks.
- Utilize appropriate plant species and seeds for re-vegetation. When revegetating disturbed sites use species that will not out-compete native plant species.
- Maintain the viability of ground cover vegetation to minimize surface erosion and where necessary, revegetate disturbed areas with appropriate plant species.

3.2.3 Pest Management Regulatory Agency

The Pest Management Regulatory Agency (PMRA) was established in April 1995 in response to the recommendations of the Pesticide Registration Review Team. The review team was charged with studying and making recommendations to improve the federal pesticide regulatory system. The federal legislative authority for the regulation of pesticides in Canada is the *Pest Control Products Act* (PCPA). With the transfer of administration of the PCPA from the Ministry of Agriculture and Agri-food to the Minister of Health, the PMRA was established in Health Canada to consolidate the resources and responsibilities for pest management regulation. The PMRA now administers the PCPA for the federal Minister of Health.

The PCPA regulates the use of substances that claim to have a pest control use including all products designed to manage, destroy, attract or repel pests that are used, sold or imported into Canada. These products include chemicals, devices,

and even organisms, and are referred to collectively as pest control products, or simply "pesticides". The PCPA also regulates other substances that are contained in pest control products, such as formulants, adjuvants and contaminants, which can also pose risks to human and environmental health.

4.0 INTEGRATED VEGETATION MANAGEMENT STRATEGY

4.1 VEGETATION MANAGEMENT OBJECTIVES

Legislation, public concerns, safety and aesthetic values dictate the need for MoT to control invasive weeds on highway rights-of-way and gravel pits. MoT vegetation management objectives include the prevention and/or minimizing of spread of invasive weeds which have the potential to have a detrimental environmental impact on:

- public or private lands, including important livestock and wildlife forage, recreational, agricultural, commercial and urban lands.

MoT has undertaken weed control on highways rights-of-way and gravel pits for decades. MoT highway corridors and gravel pits (see Appendix 2) throughout the Northern Highways Region must be monitored, inventoried and treated using an IVM approach to prevent or minimize the spread of new invasive weed infestations. IVM strategies include incorporating prevention, physical controls (manual, mechanical) and natural controls (plant competition, biological controls), along with herbicide applications (Sections 4.4–4.7). Roadside mowing (Section 4.5.2) has always been a large part of this vegetation management program. To ensure program effectiveness, MoT will co-ordinate some of these activities with key stakeholders to enhance public awareness and program effectiveness.

The priorities with which invasive weeds will be controlled depend upon the evaluation of the weed species and levels of infestation (Section 2.3). Both factors must be taken into account to prioritise whether weed control treatments are required. As stated earlier, control of a specific invasive weed species in a region already heavily infested may be of low priority. However, control of the same weed species in a newly infested area will be critical to prevent further spread.

4.0 INTEGRATED VEGETATION MANAGEMENT STRATEGY

4.2 TREATMENT AREA EVALUATION

Prior to commencement of work in a treatment area, the designated qualified Contractor and MoT representative will evaluate the treatment area to determine the appropriate method of control. Although the contracted treatment area may be predetermined in the contract document, each targeted site must be evaluated on-site prior to any treatment and the appropriate control method determined considering all available IVM techniques. A MoT representative will consider every site unique and evaluates each site on its own merits.

During this evaluation, waterbodies and other environmentally sensitive areas are identified and appropriate treatments recommended (Section 6.0). Suitable Pesticide Free Zones (PFZ) and buffers are established around these areas. Invasive weeds within PFZs can be hand pulled and bagged, mechanically cut or biological agents (if available) may be distributed to suppress and slow down the spread.

4.3 INTEGRATED VEGETATION MANAGEMENT PRACTICES

IVM involves the use of different techniques to control invasive weeds on MoT highways and gravel pits. The selection of techniques will depend on the weed species to be targeted, treatment timing, land use and environmental sensitivity. Since a wide variety of invasive weeds may grow on highways and gravel pits, a single technique is often not suitable to treat all species. An IVM approach combining different techniques is generally the most effective strategy for managing weeds. Preventative, physical, natural and biological control techniques in combination with herbicide application are used for treatment of invasive weeds on MoT highways and gravel pits. Preventative measures are implemented during construction and vegetation maintenance to ensure site conditions discourage weed growth. Physical controls include manual (hand removal, manual cutting) and mechanical (mowing) treatments. Natural controls promote the establishment of a competitive vegetation cover to out compete invasive

weeds. Biological control techniques utilize insect agents, which specifically target problem weed species. A number of herbicides (dicamba, clopyralid, glyphosate, metsulfuron methyl and picloram) are utilized for control of invasive weeds on MoT highways and gravel pits.

4.4 PREVENTION

Preventative measures aimed at impeding the spread and initial growth of invasive weeds on MoT highways and gravel pits are key components of the IVM program. These measures are incorporated into regular highway operational, construction and maintenance activities.

4.4.1 Minimizing Spread of Noxious Weeds

A primary objective for managing invasive weeds on MoT highways and gravel pits is to prevent the spread of plant material to non-infested areas. Vehicles are an important vector for the spread of weeds along MoT highway rights-of-way. For this reason, it is crucial not to transfer weeds and their seeds onto vehicles when travelling down highway corridors. Vehicles driving from weed-infested areas should be inspected to ensure that weed plant materials have not attached themselves to the undercarriage, as stated under the MoT document "Standard Specifications for Highway Construction" in Section 165, Protection of the Environment.

> *To minimize the spread of noxious weed seeds between construction sites and gravel pits/quarries, all crushing equipment and mining vehicles must be cleaned with a power/high pressure washer (manually cleaned in freezing temperatures), before entering any MoT pit or quarry. If the pit contains noxious weeds the crushing equipment and mining vehicles must also be cleaned with a power/high pressure washer (manually cleaned in freezing temperatures) before leaving the pit or quarry. Prior to the production of aggregates, the pit floor, crusher/plant location, equipment parking area, stockpile site(s), pit face(s) and area to be mined will be inspected by the Contractor for the presence of noxious*

weeds are present they must be removed mechanically by the Contractor. Noxious weeds are defined as non-native plants species designated on the provincial or regional district lists as defined by the Weed Control Act.

Weed plant material (including cut plants with mature seed heads) removed from infested sites during vegetation management activities, construction activities or vehicle inspections must be bagged and sealed prior to disposing in local landfills.

4.4.2 Seeding of Disturbed Areas

Invasive weeds commonly invade dry, disturbed soils void of a healthy, perennial vegetation cover. These include soils disturbed through road construction, road maintenance or weed removal. Exposed soils should be seeded as soon as practical after disturbance. MoT regularly hydroseeds disturbed areas to discourage the establishment and spread of invasive weeds while reducing the risk of soil erosion.

4.5 PHYSICAL CONTROLS

MoT regularly utilizes mowing to maintain vegetation along highway rights-of-way within the Northern Highways Region. This mechanical control is usually coordinated with site specific herbicide treatments, and if available, biological insect releases may be used to improve weed control. Smaller weed infestations may be managed using hand removal or manual cutting.

4.5.1 Hand Removal & Manual Cutting

MoT uses hand pulling and/or manual cutting (weed eating) of small weed infestations specifically for;

- new sites with only a few weed plants where it is advantageous to stop seed spread,
- sites close to water, wells and other riparian areas,
- sites with concern regarding damaging adjacent plants,
- sites where biological insect control is not an option,
- sites that may have significant local landowner opposition to the use of herbicide (where feasible),
- site conditions which preclude the use of herbicide treatment or the use of herbicide (window of opportunity) is not possible at the time of treatment (i.e. conditions such as weather or plant growth are not within herbicide control parameters).

4.5.2 Mowing

Mowing is the predominant technique used for managing roadside vegetation along MoT highway rights-of-way in the Northern Highways Region. Mowing is carried out by the MoT Road and Bridge Maintenance Contractors.

Mowing Objectives

The contractor will perform roadside mowing as required on highways to:

- provide a safe driving environment with good visibility of signs, delineators, animal reflectors and other roadside features, pedestrians, children and animals,
- control vegetation growth,
- provide unobstructed drainage,
- reduce possible fire hazards,
- provide neat and groomed roadsides.

Mowing is not always effective in managing invasive weeds growing amongst other vegetation, and in some cases, can enhance infestations. Although mowing

usually reduces seed production, invasive weeds are normally at least somewhat resistant to mowing because of their growth habit and ability to produce secondary flowering below the original cutting height. Some weeds in particular have shown to be aggravated by mowing, therefore all IVM techniques such as (prevention, herbicide treatments, biocontrol insect releases and manual controls) are considered when roadside treatments are necessary. It is recognised that the scheduling of mowing is important, and is generally coordinated so that it can take place prior to invasive weed seed production.

4.6 NATURAL & BIOLOGICAL CONTROLS

4.6.1 Establishing Competitive Vegetation

Invasive weeds will invade areas that provide suitable habitat for their short or long-term survival. The most susceptible areas for weed invasion are soils disturbed following construction or vegetation treatments. These soils should be seeded to a perennial, vegetation cover with grasses and legumes to promote the re-establishment of competitive cover. Seeding of larger disturbed areas is commonly by hydroseeding which involves the application of a mixture of grass seed, fertilizer, mulch and tackifier directly onto disturbed soils. Smaller disturbed areas may be hand or drill seeded. Where practical, the replanting of native shrubs and trees are encouraged to compete with undesirable weed growth. Herbicides treatments are commonly required in combination with seeding or planting to effectively inhibit growth of aggressive weed species to allow the desirable competitive vegetation to establish.

4.6.2 Biological Control Insects

The use of biological control agents has been extensively used within British Columbia since the early 1950's for management of certain noxious weed species. The agents (predominately insects) are searched out (normally from a noxious weed native environment) then rigorously tested and screened to ensure they will attack and weaken only the targeted species. Biocontrol agents reduce the vigour

of the weed and suppress the plants competitive ability against desirable plant species. The Ministry of Forests and Ministry of Agriculture, Food and Fisheries have distributed biological agents on several different locations throughout Ministry of Transportations Northern Highways Region. See appendix 4 for tables detailing biological agents and their regional distribution. Biological control techniques are normally only used for weed suppression at large sites with high noxious weed densities. A cooperative effort between land owners is normally required since noxious weed infestations occur across property boundaries. Total weed control is usually not achieved using biological control alone. Biocontrols can effectively reduce the vigour of targeted weed species allowing other a desirable plant species to establish. Biocontrols are often most effective when used in combination with other IVM techniques (prevention, physical controls, seeding, herbicide applications). This is especially important along MoT linear highway corridors where short-term containment and prevention of noxious weed spread is critical.

A complete list of current approved biocontrol agents within British Columbia can be viewed at the following web site:

www.for.gov.bc.ca/hfp/pubs/interest/bioagent/bioagent.htm

4.7 HERBICIDE CONTROL

MoT uses a limited number of approved herbicides in combination with physical and natural techniques for controlling invasive weeds growing along roadside corridors. Although herbicide applications are only one component in the MoT weed control programs, their use is critical to control the spread of invasive weeds along the vast number of highway corridors in the Northern Highways Region.

Herbicide applications by MoT are currently limited to the control of noxious or invasive alien plant species of concern and are most commonly applied using spot applications.

Herbicides approved for targeting invasive weeds on MoT highway rights-of-way and gravel pits are of low toxicity and are categorized by the duration with which the herbicide is retained within the soil.

4.0 INTEGRATED VEGETATION MANAGEMENT STRATEGY

A low residual herbicide such as glyphosate targets only existing weed plants while moderate to high residual herbicides (clopyralid, metsulfuron methyl, dicamba, and picloram) provide longer-term control targeting both existing weeds and germination or growth of immature seedlings. High residual herbicides are not selected for sensitive sites where there is a potential for soil movement, shallow aquifers, or a high concentration of course textured soil. On sensitive sites where it is not practicable to use herbicides, other treatments to eliminate or reduce further seed production and spread will be utilized.

Low (residual)	Moderate (residual)	High (residual)
glyphosate	clopyralid metsulfuron methyl dicamba	picloram

The herbicides listed below have been carefully selected by MoT and approved for use on their invasive weed program in the Northern Highways Region. In some cases, each herbicide listed below by active ingredient may have more than one formulation which may be used. The equivalent herbicide will be a registered product in Canada and have the same active ingredient but may have a different trade name and PCP number. If new herbicides approved by the Pesticide Management Regulatory Agency (PMRA) become available or other currently registered herbicides are required during the 5 year period of this PMP, it may be advantageous to introduce additional herbicides as part of this continued program. These herbicides may be amended under this PMP at such time. Their use will follow the guidelines of the British Columbia *Integrated Pest Management Act* & Regulations.

4.7.1 Dicamba (Trade Name: Vanquish – PCP Act reg. no. 19157 or equivalent)

Dicamba is a selective, post-emergent herbicide used to control herbaceous broadleaf weeds. It has low to moderate soil residual activity and provides a wide spectrum of broadleaf control.

4.7.2 Clopyralid (Trade Name: Transline – PCP Act reg. no. 24085 or equivalent)

Clopyralid is a selective, post-emergent herbicide used to control herbaceous broadleaf weeds. It has moderate soil residual activity and is often selected for application on certain weeds that have traditionally been controlled with picloram, clopyralid is less persistent in soil and has little or no effect on many woody tree and shrub species. Clopyralid is an excellent choice when targeting certain weeds such as knapweed, Canada thistle and scentless chamomile.

4.7.3 Glyphosate (Trade Name: Roundup – PCP Act reg. no. 13644 or equivalent)

Glyphosate is non-selective, non-residual herbicide used to control a broad spectrum of herbaceous broadleaf and grass species. It is only effective for treating weeds which have germinated and emerged above the soil and are actively growing at the time of spraying. Since glyphosate controls valuable grasses as well as broadleaf weeds, its use is limited on highways rights-of-way. Application is generally by wick and is used when other herbicides cannot be applied close to water. This herbicide is used extensively in gravel pits due to the soil texture.

4.7.4 Metsulfuron methyl (Trade Name: Escort – PCP Act reg. No. 23005 or equivalent)

Metsulfuron methyl is a selective, post-emergent herbicide used to control biennial, perennial and annual broadleaf weeds or undesirable brush / woody plant species. It has moderate soil residual activity and provides a wide spectrum of broadleaf control. This herbicide is effective on field scabious and perennial pepperweed.

4.7.5 Picloram (Trade Name: Tordon 22K – PCP Act reg. no. 9005 or equivalent)

Picloram is a selective, residual herbicide that can remain in the soil for several years providing long-term control against susceptible broadleaf weeds. The mode of action and soil persistence allows for a broader application window. Since picloram may persist in the soil, care is taken to avoid areas where soil may be moved or where there are shallow aquifers or domestic water intakes and wells.

4.7.6 Suggested Application Rates

Herbicide Trade Name (active ingredient)	Weed Species Controlled	Suggested Rates Kg. Ai/ha.
Tordon 22K (picloram)	Most broadleaf weeds Canada Thistle Leafy Spurge & Toadflax	0.54 kg. ai/ha. 1.08 kg. ai/ha. 2.16 kg. ai/ha
Roundup (glyphosate) Vantage	All weeds (non-selective)	3.0 kg. ai/ha. - (wick application) 2.13 kg. ai/ha
Transline (clopyralid)	Limited broadleaf species ie. Knapweed, Canada Thistle	0.3 kg. ai/ha.
Dycleer (dicamba) Vanquish	Most broadleaf weeds Diffuse Knapweed Russian Knapweed	1.1 kg ai/ha. 2.2 kg. ai/ha. 4.41 kg. ai/ha.
Escort (metsulfuron methyl)	Several broadleaf weeds ie: Canada Thistle, Perennial Pepperweed, Common Tansy, Field Scabious	18 g ai/ha. 12 g ai/ha. (Range of Rates)

All of the above rates will be cross-referenced to the recommended label rates schedule prior to herbicide application on a particular weed species. Additional information about these products including their labels and material safety data sheets (MSDS) can be accessed at these two websites:

www.hc-sc.gc.ca/pmra-arla/english/main/search-e.html
www.truenorthspecialty.com

4.7.7 Species Specific Herbicide Selections

Detailed is a list of the preferred herbicides selected to target specific noxious and invasive weed species in the Northern Highways Region. The following chart is not a complete list of invasive weeds that may be treated under this PMP. Other weeds on weed bulletins as well as newly found invaders may also be treated.

Noxious Weed / Herbicide – Preferred Treatment

Noxious Weed	Treatment on Rights-of-Way	Treatment Under Tree Canopies (if not manual)	Treatment on Coarse Textured Soils or Gravel Pits	Treatment within a Riparian Zone (not a PFZ)
Diffuse, Spotted or Brown Knapweed	picloram dicamba clopyralid	clopyralid	glyphosate	glyphosate (wick applied)
Dalmation Toadflax	picloram		glyphosate	glyphosate (wick applied)
Leafy spurge	picloram dicamba		glyphosate	
Tansy	picloram dicamba	glyphosate	glyphosate	glyphosate (wick applied)
Oxeye Daisy	picloram glyphosate & dicamba		glyphosate	glyphosate (wick applied)
Orange Hawkweed	picloram		glyphosate	glyphosate (wick applied)

4.0 INTEGRATED VEGETATION MANAGEMENT STRATEGY

Noxious Weed	Treatment on Rights-of-Way	Treatment Under Tree Canopies (if not manual)	Treatment on Coarse Textured Soils or Gravel Pits	Treatment within a Riparian Zone (not a PFZ)
Yellow Toadflax	picloram dicamba		glyphosate	glyphosate (wick applied)
Common Burdock	picloram dicamba	Glyphosate	glyphosate	glyphosate (wick applied)
Canada or Bull Thistle	picloram clopyralid	clopyralid	glyphosate	glyphosate (wick applied)
Field Scabious	picloram metsulfuron-methyl		glyphosate	glyphosate (wick applied)
Plumeless Thistle	picloram dicamba			

5.0 PMP IMPLEMENTATION

MoT implements annual invasive weed control programs within the Ministry of Transportations Northern Highways Region. Careful planning is carried out prior to and throughout weed control treatments which include implementing detailed site assessments, Monitoring, prioritizing weed management sites, selecting treatments, coordinating with other agencies, public notification, maintaining daily operation records, site monitoring, treatment evaluations, and annual reporting. Implementation is carried out subject to available program funding in any given year, and emphasis may be adjusted to address the highest priority sites and concerns.

5.1 DETAILED SITE ASSESSMENTS

MoT undertakes detailed site assessments and pre-treatment inspections of invasive weeds along highway rights-of-way and gravel pits. The information is maintained within an electronic database which contains site-specific information for weed infestations and treatment areas. This information may be combined with maps, operations records and annual reports to plan IVM treatment schedules. Site information is provided to vegetation management contractors listing treatment details, land uses
and environmentally sensitive areas.

5.2 PRIORITIZING WEED MANAGEMENT SITES

The priority with which weed management sites are selected for treatments within the Northern Highways region are based on a number of criteria including, but not limited to;

- level of invasiveness and density of invasive weed species (Section 2.3.2),
- operational, safety and aesthetic concerns,
- legislative directives,
- impacts of weeds on adjacent lands.

5.0 PMP IMPLEMENTATION

It is imperative to quickly detect and control new infestations while controlling existing sites until they can be declared weed free. Several new invasive weeds such as spotted knapweed have infested only a few sites and have been kept small in size whereas other species such as Canada thistle have been establishing within the region for quite some time covering large areas of land. It may not be feasible with available resources to control all sites or eliminate the population of these heavily established weed species. Emphasis may shift from trying to eliminate the species to preventing further spread to other un-infested sites. Efforts may be made to reduce the aggressiveness of Canada thistle on heavily infested sites while controlling Canada thistle when it is in small patches adjacent to large areas of un-infested susceptible habitat.

MoT will give weed sites the following ratings or priorities for control as based on the NWIPC 2004-05 Plan & Profile:

Priority	Purpose or Intent
1 Extremely High Risk	To stop the spread of weeds threatening currently un-infested, highly susceptible areas. These sites are less than or equal to 0.25 ha. and there is a good expectation of control. This priority also includes sites that are threatening a large neighbouring economic base, for example, seed and other high value crops.
2 High Risk	To stop the enlargement of sites in highly susceptible areas. These sites are less than or equal to 0.5 ha. Must have a reasonably good expectation of control.
3 Moderate Risk	To stop the enlargement of sites that are greater than or equal to 0.5 ha in highly susceptible areas, or less than or equal to 0.5 ha in moderately susceptible areas.
4 Moderate Risk (beyond program capabilities)	To stop the enlargement/contain sites greater than 0.5 ha in moderately susceptible areas.

5.0 PMP IMPLEMENTATION

5.3 TREATMENT SELECTIONS

5.3.1 Site Specific Assessments

Site specific assessments are essential when selecting IVM treatments targeting invasive weed species of concern. Factors such as the density and type of invasive weed species and site characteristics are critical to evaluate when selecting the treatments methods. Examples of variations in site conditions and weed characteristics which impact the treatment selections include:

Site Management Goals

The immediate and long-term goals for a weed site influence the choice of IVM options. As detailed by the NWIPC, if the invasive weed species is a category 1 weed (Section 2.3.2) on a priority 1 site (Section 5.2), the immediate goal is to prevent any spread or increase in population of the weed from the seeds and/or vegetation growth. The long-term goal will be to eliminate that weed infested site. If the weed is a category 2 weed on a priority 3 site, the immediate and long-term goals are to prevent or minimize the spread of the weed to other sites. For the first situation, category 1 priority 1, the treatment options should not only prevent spread but completely eliminate that existing weed species at the infested site. Control methods such as herbicides, hand pulling (smaller infestations) and/or grubbing could be used whereas mowing is not a good option since existing weeds are allowed to persist. For the second situation, category 2 priority 3, mowing could be considered as a treatment option.

Infestation Size

The size of the infestation and the reality of applying the various control options must also be considered. For example, a small infestation of a hundred or less plants can be hand pulled quickly with little disturbance to the site. An infestation of thousands of plants on 0.5 ha or less size site will take an excessive amount of time to hand pull. If the infestation is dense, the manual treatments may seriously disturb the site causing soil erosion. Herbicide applications on such a site can be

done quickly with little site disturbance. For larger individual sites, such as those greater than 5 ha, the resources of a weed program would be severally taxed if herbicide applications where the only option available. A treatment such as a biocontrol agent, if available, can be released on larger sites which will cost less. If biocontrol agents are not available and it is determined a large site needs to be controlled, then machine operated mowers may be an alternative.

Growth Habits of Invasive Weed Species

The characteristics or growth habit of a weed influences which IVM options will be effective. For example, hand pulling rhizomatous weeds such as Canada thistle and leafy spurge is not an effective control measure whereas hand pulling tap rooted plants such as the knapweeds and common tansy can be effective.

Site Limitations

The site characteristics and the limitations those characteristics place on control options must be determined. For example, hand pulling on a steep slope with fine textured soils can destabilized the slope. Site characteristics may restrict the use of certain herbicides. For example, the Tordon 22K label restricts its use on coarse textured soils. Furthermore, Tordon 22K use in the near proximity to riparian areas or drinking water sources is restricted.

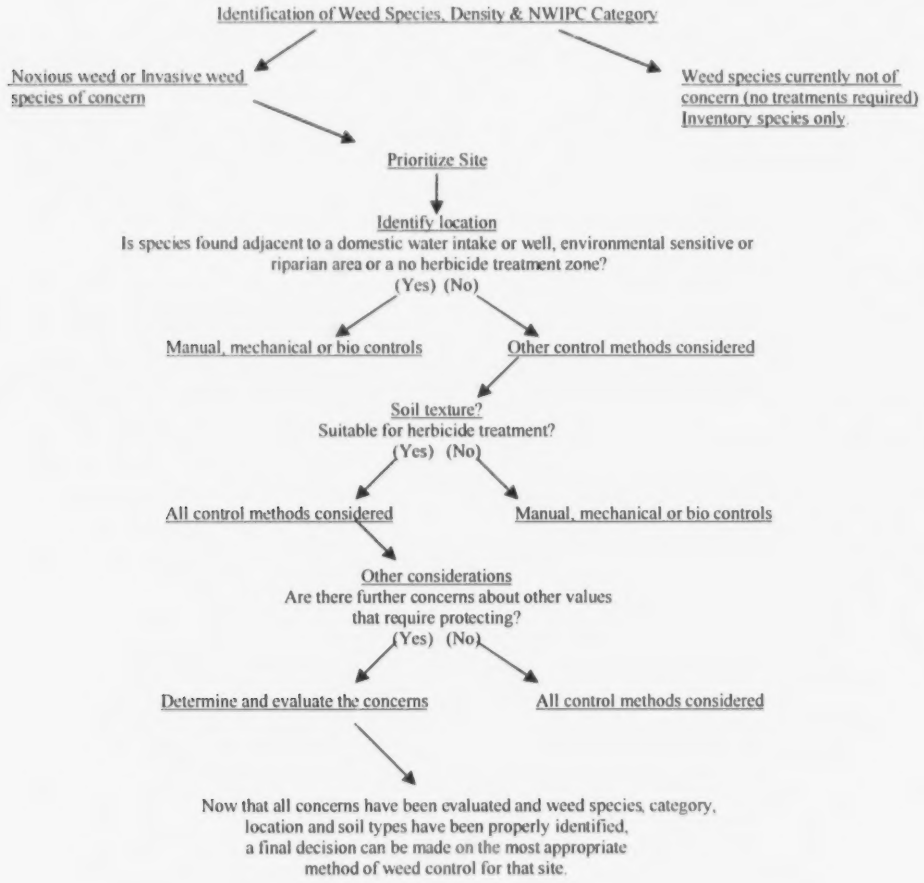
Available Treatments

Treatment selections are based on approved treatments detailed under this PMP.

5.3.2 Treatment Selection Process

MoT uses a treatment selection flow chart which considers the weed species of concern, weed density, and site characteristics when selecting suitable IVM treatments for managing invasive weed infestations. The flow chart is designed for most circumstances but recognizes that site specific conditions and professional judgement may override the recommended treatments if unforeseen circumstances arise during the term of this PMP.

Treatment Selection Flow Chart (Thresholds)


Identification of Weed Species, Density & NWIPC Category
Noxious weed or Invasive weed species of concern
Weed species currently not of concern (no treatments required) Inventory species only
Prioritize Site
Identify location
Is species found adjacent to a domestic water intake or well, environmental sensitive or riparian area or a no herbicide treatment zone?
(Yes) (No)
Manual, mechanical or bio controls
Other control methods considered
Soil texture?
Suitable for herbicide treatment?
(Yes) (No)
All control methods considered
Manual, mechanical or bio controls
Other considerations
Are there further concerns about other values that require protecting?
(Yes) (No)
Determine and evaluate the concerns
All control methods considered
Now that all concerns have been evaluated and weed species, category, location and soil types have been properly identified, a final decision can be made on the most appropriate method of weed control for that site.

5.4 INTER-AGENCY COORDINATION

MoT invasive weed programs are commonly implemented in conjunction with several external regulatory agencies and stakeholder groups since infestations normally cross many jurisdictional boundaries. MoT is an active member and participates actively in regional weed committees. These cooperative programs may be initiated by MoT or led by other agencies with MoT providing secondary assistance. Since the *Weed Control Act* states that 'every occupier has the responsibility to control noxious weeds', MoT conducts its integrated noxious weed control program in the Fort George District of the Northern Highways Region in communication and co-operation with other agencies and 'land occupiers' including, but not limited to,

- BC Cattleman's Association
- BC Hydro
- BC Ministry of Agriculture, Food & Fisheries
- BC Ministry of Forests
- BC Ministry of Water, Land and Air Protection
- First Nations
- BC Parks
- BCTC
- City of Prince George
- Government of Canada, Canadian Wildlife Service
- Land & Water BC
- Ministry of Health
- North West Invasive Plant Committee
- Private landowners
- Regional District of Bulkley - Nechako

5.5 PUBLIC NOTIFICATION

5.5.1 General Public

Published Notifications

Prior to confirmation of the final PMP to the Ministry of Water, Land and Air Protection, MoT will publish 2 Notices of Intent to Develop a Pest Management Plan in local newspapers. Concerns or comments regarding the PMP must be received by MoT in writing within 30 days of the publication of the newspaper notification.

Signs Identifying Treatment Locations

Under Section 64 of the *Integrated Pest Management Act* Regulations a treatment notice must be posted on public land prior to implementing vegetation management treatments. This sign must be clearly visible and legible for public approaching the treatment area. The number of signs posted at each site will be determined by factors including the length of the treatment site, access points, residential density and public buildings.

Each herbicide treatment notice sign will specify:

- Title - " Notice of Herbicide Use" (Bold block letters),
- Proposed date and start time of application,
- Name of target pest,
- Confirmation (PMP) #,
- Pesticide active ingredient name and *Pest Control Product Act* Registration Number (P.C.P)
- Phone number at which a licensee or proponent can be reached for further information about the pesticides used,
- Precautions that can be taken to minimize exposure to people entering the treatment area.

Signs will normally be placed immediately along the highway or road prior to the start of spray operations at the point of commencement, and then in key locations

along the spray route. Signs will remain posted for a minimum of 14 days post-treatment.

5.5.2 First Nations

First Nation consultation will follow policy and procedures provided by the Ministries of Aboriginal Affairs, Ministry of Water, Land and Air Protection, *Integrated Pest Management Act & Regulations* and MoT. Results of the consultation process with First Nations, MoT and its agents will be documented and available for review in a consultation report.

5.6 HERBICIDE APPLICATION & OPERATIONAL PRACTICES

The transportation, storage, handling, application and disposal of herbicides are governed by federal and provincial legislation. All MoT Contractors working with herbicides will follow safe handling practices including workplace requirements for WHMIS labelling and worker education. The required practices and legislated regulations are detailed in:

- Workers Compensation Board of British Columbia (1998) *Occupational Health & Safety Regulation – BC Regulation 296/97 as amended by BC Regulation 185/99 – Sections 6.70 to 6.109.*
- *Integrated Pest Management Act & Regulations.*
- B.C. Ministry of Environment, Lands and Parks (1995) *Handbook for Pesticide Applicators and Dispensers.*
- B.C. Ministry of Forests (FRDA 006) Herbicide Field Handbook.
- Workers Compensation Board of British Columbia (1990) Standard Practices for Pesticide Applicators.

5.6.1 Certification, Licensing & Insurance

- contractors applying herbicides under this PMP must have a valid British Columbia Pesticide Control Service Licence,
- applicators applying herbicides under this PMP must be certified with a valid British Columbia industrial vegetation or noxious weed pesticide applicators certificate or be supervised by a certified applicator.
- Contractors applying herbicides under this PMP must have appropriate liability insurance approved by MoT.

5.6.2 Transportation of Herbicides

The transport of herbicides is regulated by the federal *Transportation of Dangerous Goods Act (TGA)* and the provincial *Integrated Pest Management Act Regulations*. The federal Act regulates the handling and transportation of poisonous substances, which may include some herbicides. At this time no herbicides covered under this PMP fall under the federal Act. The provincial *Integrated Pest Management Act Regulations* (Division 7) also specifies certain transport procedures.

The following procedures will be followed while transporting herbicides for application under this PMP;

- limited amounts of herbicide concentrate will be carried in any one vehicle. The quantity will be no more than what is necessary for each project,
- herbicide concentrate will only be carried in a secure lockable compartment,
- herbicide concentrate will only be transported in original labelled containers or containers that have the label displayed with the trade name, active ingredient, concentration amount and PCP #. (mixing and holding tanks are not subject to this clause).
- herbicide concentrate will always be carried separately from food and drinking water, safety gear and people,
- spill-containment and clean up equipment will be carried separately from herbicides but in close proximity to the herbicide on each vehicle during herbicide transport and use,

- appropriate documents such as operations records and material safety data sheets (MSDS) will be carried in each vehicle during herbicide transport and use.

5.6.3 Mixing & Loading of Herbicides

Mixing of herbicides must be conducted in a very safe manner at the time when concentrates are mixed with their carriers, such as water or other mixing agents. Safety spill kits and spill response plans will be present on site. Safe practices for the mixing of herbicides detailed in the B.C. Ministry of Environment, Lands and Parks (1995) *Handbook for Pesticide Applicators and Dispensers* & B.C. Ministry of Forests (FRDA 006) *Herbicide Field Handbook* will be followed under this PMP.

5.6.4 Herbicide Storage

Herbicides will be stored in accordance with the *Integrated Pest Management Act Regulations* and the Workers' Compensation Board document *"Standard Practices for Pesticide Applicators."*

Presently, MoT requires that herbicide Contractors;

- purchase and store all herbicide,
- have a proper storage facility that is a secured, lockable room vented to the outside and accessible only to those with authority to access. This storage room is equipped with necessary spill clean up and first aid equipment in the event of spill, and warning signs on the entrance door. Material Safety Data Sheets must also be available to review.
- Mobile vehicles that are used for herbicide treatment and short term storage must have lockable compartments separate from passenger area of vehicle and all herbicides must be locked when unattended.

5.6.5 Container & Residual Storage

The responsibility of herbicide container disposal associated with the noxious weed control activity presently lies with the Contractor. The Contractor must triple rinse and then puncture empty herbicide containers to prevent their reuse. These destroyed containers must then be disposed of at an appropriate landfill site. In some cases, herbicide distributors are accepting empty, clean containers for recycling. Options for returning containers are expected to increase as more distributors or manufacturers expand these types of programs. MoT encourages all contractors to use a recycling program if available in their area. Any unused chemical must be returned to the storage facility in the original container for future use.

5.6.6 Herbicide Application Methods

Herbicide application methods to be used under this PMP include;

- truck mounted spray tank with power hose/nozzle,
- ATV mounted spray tank with power hose/nozzle or boomless nozzle,
- backpack sprayers,
- wick applicators.

5.6.7 Herbicide Equipment Calibration

Equipment will be supplied by Contractor(s) and maintained in good working condition with no leaks. An inspection or calibration of equipment will occur in the presence of the MoT representative prior to the commencement of weed control activities each year. Ongoing calibration of equipment will be conducted throughout the treatment season by equipment operators in accordance with the *Integrated Pest Management Act Regulations*. MoT representatives can and will make periodic inspections at any time during the contract to ensure equipment calibrations have been completed.

5.6.8 Spill Response Plan

A copy of this spill plan must be available at each work site. All personnel working on the project must be familiar with its contents. All Contractors that work under this PMP must have their own spill response plan, posted and or available to their employees and it must meet or exceed the contents in this plan.

The following procedures must be followed if a spill occurs;

- protect all personal from herbicide contamination by wearing appropriate safety gear,
- move any exposed person away from the place of the spill and keep the individual warm. Provide first aid, if necessary,
- stop the source of the spill,
- stop the spilled material from spreading by creating a dam or ridge,
- inform the project supervisor immediately of the spill,
- the project supervisor will ensure all personnel working on the project are aware of a spill has occurred and the cleanup procedures have commenced,
- the project supervisor will ensure all operations cease until the spill is contained and the source is repaired,
- spread absorbent material over the spill, if applicable, to absorb up any liquid,
- collect the absorbent material into garbage bags or containers. Clearly mark the contents,
- remove any contaminated soil or material from the spill site and collect in garbage bags or containers,
- phone Ministry of Water, Air and Land Protection and receive instructions regarding the disposal of contaminated materials,
- report the spill as per the spill reporting procedures.

5.6.9 DAILY OPERATION RECORDS

Daily Operation Records must be completed by all applicators applying herbicides on MoT highway rights-of-way or gravel pits. The records will include the treatment location, targeted species, herbicide(s) applied, P.C.P. No., application rate, treatment area, application method and weather conditions. MoT will retain all records and maps of site assessments, inventories and treatments as per the *Integrated Pest Management Act Regulations*.

5.6.10 PROCEDURES FOR IDENTIFYING TREATMENT BOUNDARIES

All areas that are scheduled for herbicide treatment shall be inspected on the ground and be subject to a ground layout in order to locate and mark all treatment boundaries including Pesticide Free Zones (PFZ's). All boundaries that have been marked will be clearly visible to the applicator and monitors for inspection. Pre-treatment layout will be conducted prior to treatment as this will insure that any markings will remain in their original location. Boundary layouts may be conducted with the use of photos, diagrams, compasses or GPS and will be transferred to or referenced with maps.

These maps will be available to the Ministry of Water, Land and Air Protection (MWLAP) if requested, prior to any herbicide treatment. These layout maps will be on site during treatment and the on site supervisor as well as all applicators will review the maps prior to treatment.

5.7 SITE MONITORING & EVALUATION

Weed inventory and monitoring are ongoing for MoT, MoT Contractors and cooperative agencies throughout the year and are revised on a regular basis. MoT is in regular contact with interested parties including the Ministry of Agriculture, Food and Fisheries, Ministry of Forests, regional districts, local cattleman associations, regional weed committees and the general public and is notified when new weed infestations are found. MoT meets with Contractors prior to beginning vegetation management treatments to discuss herbicide applications, manual and mechanical methods, soil types, weed species, weed densities, riparian areas and other contractual details. They also monitor Contractor performance as required throughout the project to ensure proper procedures are followed.

MoT conducts post-treatment site evaluations following implementation of vegetation management treatments. Herbicide efficacy is determined at this time by observing levels of desiccation and chlorosis of treated plants. If dye is deemed necessary it is added to spray solution and provides an indicator of treatment coverage. Contractors may be required to retreat sites if the post-treatment site evaluations demonstrate low treatment efficacies.

- Weather monitoring is completed by the applicator / contractor before during and after any herbicide treatment, this data is collected and recorded on the daily operations records. (See section 5.6.9)

5.7.1 STRATEGIES FOR WEATHER MONITORING

Measurements will be made to record weather conditions prior to and periodically during herbicide applications. Wind speed and direction, precipitation, temperature, frost, dew and sky conditions (clear, overcast, cloudy, partly cloudy) will be recorded for foliar herbicide applications using all methods of treatment.

Herbicide application will be shut down if:

· the maximum temperature allowable is exceeded;
· the wind speed exceeds the allowable speed and/or direction causes the treatment to miss the target intended for or,
· it begins to rain, increasing the chances of excessive runoff and leaching.

5.8 ANNUAL REPORTING

5.8.1 Annual Notification

MoT will forward in writing an annual report to the administrator prior to January 31st of the next calendar year for the work completed during the year prior. The Annual Summary of Pesticide Use Records for the previous year will include:

- Name and address of the confirmation holder,
- Herbicide trade name,
- Active ingredient,
- Amount of kilograms used and total area treated,
- Methods used to apply pesticides,
- Methods of non-pest controls used and estimated area treated,

5.8.2 Annual Notice of Intent to Treat

After weed and site assessments have been completed and 21 days prior to the commencement of treatments for the applicable calendar year, a written notice of intent to treat will be submitted to the administrator with the following information;

- Name and business location of confirmation holder,
- A description of the proposed area of treatment and map or diagram of that area showing geographic features that may require pesticide free zones,
- Proposed pesticide use and method of application,
- The proposed total area of treatment in that calendar year,

MoT will retain all records including site assessments, noxious weed inventories, control treatments, methods and activities. This information will be available for viewing within (3) business days of request at the MoT Prince George Regional Office, 213-1011 4th Ave, Prince George, BC, V21 3H9, Phone (250) 565-6365 during regular office hours.

5.8.3 Amendments

MoT will forward to the Administrator the appropriate information as per the *Integrated Pest Management Act & Regulations;*

- at least 2 days in advance if an amendment is needed to increase the total area treated with herbicides by up to 10%,

- at least 21 days in advance if an amendment is needed to increase the total area treated with herbicides if greater than 10%. A new notice of intent to treat must be sent to the administrator under Section (42) Subsection (3) of the *IPM Regulations*.

6.0 ENVIRONMENTAL PROTECTION

MoT recognizes the importance of carrying out weed control work in an environmentally responsible manner, and in this regard, the use of herbicides in particular will be employed judiciously and appropriately. Environmentally sensitive areas (ESAs) will be identified and extreme caution will be exercised when working around waterbodies (streams, rivers, lakes or wetlands) and other environmentally sensitive areas (agricultural lands, urban landscaping, hazard lands, sensitive wildlife habitat, protected or sensitive plants) when implementing IVM techniques under this PMP. Pesticide Free Zones (PFZs) will be maintained adjacent to these sensitive areas when applying herbicides. Suitable buffer zones will also be used to ensure protection of the PFZ from herbicide drift, runoff or leaching.

6.1 WATERBODIES

6.1.1 Waterbodies Definition

Under the *Integrated Pest Management Act Regulations* the definition "body of water" does not include a human-made, self-contained body of or structure for water.

The federal *Fisheries Act* does not provide a direct definition for types of water bodies. The *Act* instead specifies under Section 35(1) that "No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat. The *Act* under Section 34 (1e) defines fish habitat as "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes".

Under the *Fisheries Act*, regulated waterbodies will likely include all lands covered by water that may be standing or flowing including:

- Water classified as a stream or river,
- Water in a lake or wetland,
- Marine or estuarine water, or
- Fish bearing water

Stream or River has the same meaning as under the *Forest and Range Practices Act*, it means a watercourse, including a watercourse that is obscured by overhanging or bridging vegetation or soil mats that contain water on a perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, and that has a continuous channel bed that is 100 m or more in length, or flows directly into

- a fish stream, river or fish-bearing lake or wetland, or
- a licensed water works;

Wetland has the same meaning as under the *Forest and Range Practices Act, it* means a swamp, marsh, bog or other similar area that supports natural vegetation, which is distinct from adjacent upland areas,

Marine or Estuarine water means a waterbody in an inlet or arm of the sea or ocean.

Fish bearing in relation to a body of water or classified wetland, means the body or water or classified wetland is frequented by,

- anadromous salmonids,
- rainbow trout, cutthroat trout, brown trout, bull trout, Dolly Varden char, lake trout, brook trout, kokanee, largemouth bass, smallmouth bass, mountain whitefish, lake whitefish, arctic grayling, burbot, white sturgeon, black crappie, yellow perch, walleye or northern pike,
- a species of fish identified as a species at risk under section 11 (1) or the *Government Actions Regulation*,
- a species of fish identified as regionally important wildlife under the *Government Actions Regulations*,

6.1.2 Riparian Areas

Riparian Areas are the strips of land immediately adjacent to streams, rivers, wetlands and other water bodies. They support lush plant growth, and stay green longer than other areas not alongside surface water. A thriving riparian plant community is an integral component of fish habitat regulating water temperature, controlling erosion, and providing fish with cover and food. Dense vegetation regulates the amount of sunlight that reaches the stream which regulates water temperature. Root mats of grasses and shrubs shield soils from surface erosion

while roots of larger trees help to maintain the structural integrity of the banks. Roots and organic debris also filter surface runoff, effectively removing suspended solids before they enter the stream channel. Riparian areas provide shelter and cover by contributing large woody debris such as stumps, logs, and rood wads to streams. Large woody debris give fish places to hide from predators, contributes to stream bank stability, and increases the in stream habitat diversity.

The riparian zone is both a direct and indirect source of fish food. Terrestrial insects drop from overhanging vegetation to provide fish with a direct source of food. Organic matter such as leaves and needles provide an indirect food source once they fall into the stream and are subsequently consumed by invertebrates which are in turn consumed by fish. Riparian areas provide a diversity of plant species which in turn support a broad variety of bird and wildlife species which have differing needs for food supplies, nesting and denning sites, shelter from weather extremes, and places to hide from predators. Riparian areas provide corridors for wildlife, by providing a sheltered route which connects larger habitats together. This allows animals to migrate from one area to another according to seasonal or life cycle requirements, with some level of protection. Many animals will avoid crossing large open areas which make them vulnerable to predators.

Riparian Area

6.1.3 Community Watersheds

MoT Northern Highways Region rights-of-way are commonly situated within Community Watersheds as listed in Appendix 3. The definition for a community watershed given in Bill 18-1995 (June 1995) which amends section 41(8) of *Bill 40 (1980)*, is:

> The drainage area above the most down stream point of diversion on a stream for a water use that is for human consumption and that is licensed under the *Water Act* for:
>
> (i) a waterworks purpose, or
>
> (ii) a domestic purpose if the license is held by or is subject to the control of a water users' community incorporated under the *Water Act*,
>
> (iii) if the drainage area is not more than 500 km^2 and the water license was issued before June 15, 1995.

This definition excludes communities whose source of drinking water is provided by lakes and springs, some of which had been designated as community watersheds in the 1980 *Guidelines*. Considerations of these exclusions are covered by Section 41(10) which allows the MoF regional manager to designate an area as a community watershed. Some lake sources are being reviewed and will be designated as community watersheds where appropriate. A procedure is being developed for defining the source area for springs so that these can also be considered under Section 41(10).

In addition, there are watersheds where the community water use of a stream may be somewhat less well defined than the waterworks systems defined above, but where the concept of a community using the water is still recognized can also be considered under Section 31(10). These include individual water users and/or joint works water systems (i.e., where two or more water users share a common water system) that are licensed under the *Water Act* for domestic purpose. The community watershed is defined as the area upstream of the most downstream water intake.

6.1.4 Pesticide Free Zones (PFZ)

"**Pesticide Free Zone**" means an area of land that,

- must not be treated with pesticide,
- must be protected from pesticide moving into it.

The following PFZ Restrictions will be applied alongside all water bodies, (see section 6.1.1 for definition of water body).

- a 10m PFZ will be maintained along all water bodies, dry streams and classified wetlands, except
    - glyphosate applications may be applied up to 1 m from the high water mark, provided that, between 1 m and 10m from the high water mark, only selective application methods are used,
    - a 30 m no-treatment zone around a water supply intake or well used for domestic or agricultural purposes, including water for livestock or for irrigation of crops,
        - under the *Integrated Pest Management Act Regulations, section 71, other exceptions may apply.*

Additional PFZ restrictions may apply on MoT highway rights-of-way and gravel pits when applying residual herbicides (clopyralid, metsulfuron methyl, and picloram). No residual herbicides will be applied:

- within a 15 m PFZ along all water bodies when applying metsulfuron methyl,
- on water-saturated soil, during heavy rainfall or if heavy rainfall is imminent,
- if foliage is covered by ice or frost or if water is flowing on the foliage,

Picloram or clopyralid will not be applied to roadside ditches that contain water that will drain within a PFZ to natural water bodies or water sources used for irrigation purposes.

6.2 PLANTS & WILDLIFE PROTECTION

6.2.1 Protected or Sensitive Plants

High value berry producing plants that have the potential to or are know to be consumed or collected by humans and other important native plant species on the rights-of way are not targeted for treatment. Their growth along with grass species is encouraged. In most cases, there are non-treatment areas established around plants identified as sensitive. Rare or endangered native plants that have been recognized will be protected from herbicide applications where practical. First Nations or other members of the public may identify these sites during higher level planning, consultation or referral.

Selective application of glyphosate may be applied within 1 m of agricultural land which is actively utilized by livestock or actively producing crops. All other herbicides approved under this PMP will be applied as per label recommendations in areas actively producing crops or that are grazed by livestock.

6.2.2 Sensitive Wildlife Habitat

The part of the ecosystem where a wildlife species lives is known as its habitat. A habitat is not just a geographical place; it includes the food, shelter, and climate without which a species would not survive.

British Columbia is home to tens of thousands of plant and animal species living in a rich diversity of habitat. Wildlife habitat areas (WHAs) are areas managed and or protected for selected species and plant communities.

Monitoring and conserving wildlife habitat, by protecting and improving the quality of soil, water, air, and other natural resources are just a few ways to protect habitat.

Protection of wildlife habitat is very difficult to maintain on MoT highway rights-of-way and is not encouraged due to detrimental conflicts between wildlife and

motor vehicles. Having said this, MoT takes every precaution to protect habitat in accordance to Strategic Land Use Plans and other legislation.

6.2.3 Hazard Lands

Alternative vegetation management treatments may be required for hazard lands (geological hazards, extreme slopes, floodplains, etc.) where removal of specific vegetation will cause unstable, hazardous conditions.

Hazard Lands

6.2.4 Agricultural Lands

Alternative vegetation management treatments may be required on highway right-of-way situated adjacent to agricultural land which is actively utilized by livestock or actively producing crops.

Agricultural Lands

6.2.5 Urban Landscaping

Landscaped areas are commonly located on traffic medians, within interchanges and at rest areas within and alongside MoT highway right-of-way. These areas require regular maintenance to control weeds established in the landscaping. Alternative vegetation management treatments may also be required alongside sensitive urban landscaping on adjacent private or municipal properties.

APPENDIX 1

Map of Highway Districts

Peace
Northern Region
Fort George
Bulkley - Stikine
Cariboo
Southern

APPENDIX 2

MoT Gravel Pits

Pit Map of Service Area 19
Fort George

APPENDIX 3

Community Watersheds

APPENDIX 3

The following is a List of community watersheds that are included under this PMP and that are located in the Ministry of Transportations Northern Region boundaries.

Prince George Region	Source Name	Status
Avola Community wateshed	Avola Creek	Designated
Dominion Community Watershed	Dominion Creek	Designated
Edand Community Watershed	Edand Creek	Designated
Martinson Community Watershed	Matinson Creek	Designated
Pritchard Community Watershed	Pritchard Creek	Designated
Swift Community Watershed	Swift Creek	Designated

APPENDIX 4

Biocontrol Agent Releases Summary

APPENDIX 4

Biological Control Insect Agents, Status and Weeds Controlled.

Weed	Agent(s)	Description	Status in Region	Biocontrol Worked Proposed	Impact of Agent
Nodding thistle	Rhinocyllus conicus	Seed head weevil	agent is not available but are expected to arrive soon	Detect the arrival of nodding thistle then identify biocontrol release sites if possible	Combined with other agents offers successful biocontrol, (reduces weed populations to an acceptable threshold)
	Trichosirocalus horridus	Weevil – larvae mines and feeds on vegetative buds	*As above*	As above	As above
Plumeless thistle	Rhinocyllus conicus	Seed head weevil	Agent is not available at this time but are expected to arrive soon	Detect the arrival of plumeless thistle and try and control sites before they can establish. If the thistle establishes then identify sites for release of biocontrol agents.	Unlike nodding thistle, the biocontrol agents are not always decreasing plumeless thistle populations in other parts of the province.
	Trichosirocalus horridus	Weevil – larvae mines and feeds on vegetative buds	*As above*	As above	As above
Marsh thistle	Rhinocyllus conicus, Ttrichosirocalu horridus, Larinus planus	Weevils	As above	None – marsh thistle sites will be controlled by pulling, rogueing and sometimes herbicides as they show up. If large sites develop then biocontrol will be considered.	This is a relatively new weed to BC. There are no indications from eastern north America, where marsh thistle is more prevalent, that biocontrol agents have managed to impact the weed populations.
Spotted knapweed	Afapeta zoegana	Root mining moth	Unknown, not released	None – spotted knapweed sites will be controlled by hand pulling and sometimes herbicide applications.	The complex of agents currently available for spotted knapweed has not impacted weed populations in any locations in the province.
	Chaetorellia acrolophi	Weevil	As above	As above	As above
	Larinus minutus	Weevil	As above	As above	As above
	Larinus obtusus	Weevil	As above	As above	As above
	Metzneria paucipunctella	Seed head moth	Released in the district. Status unknown	As above	As above
	Pellochrista medullana	Root mining moth	Unknown, not released	As above	As above
	Puccinia jaceae	Stem and leaf rust	As above	As above	As above
	Sphenoptera jugoslavica	Root mining beetle	As above	As above	As above
	Terellia virens	Fly	As above	As above	As above

APPENDIX 4

Weed	Agent(s)	Description	Status in Region	Biocontrol Worked Proposed	Impact of Agent
	Urophora affinis & U. quadrifasciata	Seed head gall forming flies	Released in the region, status unknown	As above	As above
Canada thistle	Ceutorhynchus litura	Weevil	Unknown, not released	This agent will be released if it becomes available	The complex of agents currently available for Canada thistle has not impacted the weeds population in any locations in the province.
	Larinus planus	Seed head weevil	Released at 2 sites in the region, Status unknown	Additional releases of this agent may be made as the agent becomes available. The agent will be monitored to determine if it establishes and disperses.	As above
	Urophora cardui	Stem gall fly	Released at 1 site in the district. Status unknown.	As above	As above
	Rhinocyllus conicus. Cleonis pigra, Cassida rubiginosus, Terellia ruficauda Puccinia punctiformis, Dasineura gibsoni	Weevil, root crown weevil, defoliating beetle, seed head fly, systemic rust fungus and small midge	Unknown, not released	These agents may be released if they become available	As above
Bull thistle	Urophora stylata	Seed head gall fly	Released & established.	Monitoring will occur to ensure the agent is dispersing on its own and indicate if additional releases are required.	Proper management, minimising and seeding disturbances and having proper grazing practices combined with this agent shorten the time that bull thistle is a problem.

APPENDIX 4

Weed	Agent(s)	Description	Status in Region	Biocontrol Worked Proposed	Impact of Agent
Diffuse knapweed	Agapeta zoegana, Chaetorellia acrolophi, Larinus minutus, Larinus obtusus, Pelochrista medullana, Pterolonche inspersa, Puccinia jaceae, Sphenoptera jugoslavica, Urophora affinis, U. quadrifasciata	Moth, fly, weevil, weevil, moth, moth, stem and leaf rust, beetle, fly & fly	Unknown, not released	None – diffuse knapweed sites will be controlled by hand pulling and sometimes herbicide applications.	The complex of agents currently available for diffuse knapweed appears to have impacted the weed population on dry southern interior sites but not else where in the province.
Leafy spurge	Aphthona cyparissiae, A. czwalinae, A. flava, A. lacertosa, A. nigriscutis, Hyles euphorbiae and Lobesia euphorbiana	Flea beetles and the last 2 are moths	Neither weed nor agents are present at this time. The forest district, Morice, has released Aphthona cyparissiae on its single leafy spurge site.	Monitor for the appearance of leafy spurge and control sites with herbicides and or rogueing.	The combination of agents available has reduced leafy spurge populations on some sites.
St. John's Wort	Agrilis hyperici, Aplocera plagiata, Aphis chloris, Chrysolina hyperici, C. quadrigemina	Beetle, moth, aphid, beetle and beetle.	St. John's Wort is making its way from the East and West mostly along highway 16 but has yet to show up on the weed inventory.	When St. John Wort sites large enough to release agents on are inventoried requests for a supply of agents will be made.	The agent is successful in keeping St. John's Wort populations at acceptable levels on some sites in the rest of the province. There are some locations, e.g., in Boundary Forest District, where St. John's Wort is still dominating substantial areas of habitat.
Dalmation toadflax	Mecinus janthinus	Stem mining weevil	2 releases of this agent have been made in lakes forest District. Monitoring has not detected any establishment.	Continue to release this agent, as it becomes available and monitor it for establishment and dispersal.	The complex of agents currently available for Dalmation toadflax has not impacted the weed populations in any locations in the province. Some of the agents have not had time to build up in population so the full impact of biocontrol is not known.

APPENDIX 4

Weed	Agent(s)	Description	Status in Region	Biocontrol Worked Proposed	Impact of Agent
	Brachypterolus pulcarius, Gymnaetron antirrhinis	Beetle & weevil	These agents are present on common toadflax and may spread onto Dalmatian toadflax.	Monitor to see if the agents appear on Dalmation toadflax.	As above.
	Calophasia lunula, Eteobalea intermediella	Moths	Not released – not known	These agents may be released and monitored if they become available	As above
Common toadflax	Brachypterolus pulicarius, Gymnaetron antirrhini	Beetle, weevil	Present on all common toadflax sites monitored.	Occasional monitoring.	The combinations of biocontrol agents appear to be keeping common toadflax populations at acceptable levels. The population of common toadflax does cycle up to high levels at times.
	Calophasia lunula, eteobalea serratella, mecinus janthinus	Moth, moth, weevil	These agents have not been released in Lakes forest district and it is suspected they are not present.	These agents also attack Dalmation toadflax. If they become available they will be released on Dalmatian toadflax and common toadflax sites will be monitored to see if they establish on common toadflax as well.	As above

* Information provided by British Columbia Ministry of Forests